

NON-PUBLIC?: N  
ACCESSION #: 9209090119  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: North Anna Power Station Unit 2 PAGE: 1 OF 4

DOCKET NUMBER: 05000339

TITLE: MAIN STREAM TRIP VALVE FAILED SHUT CAUSING A REACTOR TRIP  
AND  
SAFETY INJECTION DUE TO FAILURE OF THE MAIN STEAM TRIP VALVE AIR  
CYLINDER RUPTURE DISC.  
EVENT DATE: 08/06/92 LER #: 92-007-00 REPORT DATE: 08/28/92

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv), 50.73(a)(2)(v)

LICENSEE CONTACT FOR THIS LER:  
NAME: G.E. Kane, Station Manager TELEPHONE: (703) 894-2101

COMPONENT FAILURE DESCRIPTION:  
CAUSE: B SYSTEM: BQ COMPONENT: ISV MANUFACTURER: B487  
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On August 6, 1992, at 0751 hours, with Unit 2 at 100 percent power (mode 1), the "C" main steam trip valve (MSTV) failed shut causing a safety injection and reactor trip. The initiating signal for the safety injection was high steam line flow coincident with low steam line pressure in two out of three main steam lines. At 0756 hours a Notification of Unusual Event was declared and the Emergency Plan Implementing Procedures were entered. A one hour report was made pursuant to 10CFR 50.72 (a) (i). At approximately 0800 hours during the plant trip/SI recovery a leak was discovered on the downstream weld of a LHSI discharge line isolation vent valve. Since the piping could contain highly radioactive fluid during the post Loss Of Coolant Accident recirculation mode, the potential exists for an unmonitored gaseous release to the environment through a normally running exhaust fan. A

four hour report was made pursuant to 10CFR50.72 (b) (2) (iii) (C). This event is reportable pursuant to 10CFR50.73(a)(2)(iv) and (v).

The cause of the C-MSTV closure has been attributed to failure of the C-MSTV air cylinder rupture disc. The valve weld failure is believed to be a result of an overstress condition when the LHSI pumps started on the SI signal.

No significant safety consequences resulted from this event because all safety systems responding appropriately and the unit never entered a post LOCA recirculation mode. Therefore, the health and safety of the public was not affected at any time during this event.

END OF ABSTRACT

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## 1.0 Description of the Event

On August 6, 1992, at 0751 hours, with Unit 2 at 100 percent power (mode 1), the "C" main steam trip valve (MSTV) (EIIS System Identifier SB, Component Identifier ISV) failed shut causing a safety injection (SI) and reactor trip. The initiating signal for the safety injection was high steam line flow coincident with low steam line pressure in two out of three main steam lines. At 0756 hours a Notification of Unusual Event (NOUE) was declared and the Emergency Plan Implementing Procedures (EPIP) were entered. A one hour report was made pursuant to 10CFR 50.72 (a) (i). At 0802 the Safety Injection termination procedure was entered. During the event the pressurizer (PZR) went solid with Reactor Coolant System (RCS) pressure control through one Pressurizer Power Operated Relief Valve (PORV) (2-PCV-2455C) (Component Identifier RV). Heat removal was accomplished through the main steam PORVs due to closure of the MSTVs. At approximately 0800 hours during the plant trip/SI recovery a leak was discovered on the downstream weld of isolation vent valve 2-SI-337 (EIIS System Identifier BQ) (EIIS Component Identifier ISV). The valve is on the Low Head Safety Injection (LHSI) Pump 1B (EIIS System Identifier BP) (EIIS Component Identifier P) discharge to the High Head Safety Injection Pump Suction Header, used in the recirculation mode during a Loss Of Coolant Accident (LOCA). The isolation vent valve weld failed due to an overstress condition when the LHSI pumps started on the SI signal. Since the piping passes through the Quench Spray Pump House (QSPH) basement and could contain highly radioactive fluid during the post LOCA recirculation mode, the potential exists for an unmonitored gaseous release to the environment through a normally running exhaust fan. A four hour report was made pursuant to 10CFR50.72 (b) (2) (iii) (C). This event is reportable pursuant to 10CFR50.73 (a) (2) (iv) and (v). This was the

seventh Emergency Core Cooling System (ECCS) (EIS System Identifier BQ) actuation reportable pursuant to Technical Specification 6.9.2.

Performance of E-0 and ES-1.1 was methodical and systematic in verifying all Safeguards functioned as designed as well as completing the proper diagnosis. Prior to terminating SI flow to the RCS the PZR filled to a solid condition. The PZR PORV functioned as designed to control system pressure during the event.

The three quarter inch isolation valve, 2-SI-377, was installed in 1989 to provide venting capability in response to potential gas binding of the High Head Safety Injection Pumps. Subsequently, a half inch tubing line and isolation vent valve were added to 2-SI-377 in March 1990 to allow venting from an accessible location. The half inch vent line, 1/2"-SI-691-ICN8-Q2, was not flexible enough to accommodate the axial movement of the eight inch LHSI discharge line, 8"-SI-449-153A-Q2.

The weld in question failed previously on March 28, 1991 during the performance of the LHSI Pump periodic test 2-PT-57.1B. The weld was repaired on April 12, 1991. The engineering evaluation of this event determined that the cause of the leak was due to a faulty weld. The cracked weld was considered an isolated case of a passive failure due to a faulty weld and did not constitute a credible concern for a potential release to the environment

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#### 1.0 Description of the Event (cont.)

in excess of the limits in 10 CFR 100 following a LOCA. This event was determined non-reportable because the QSPH basement floor drainage is processed by way of the liquid waste system through the auxiliary building sump and the refueling water storage tank (RWST), the initial water supply for the LHSI pump during a LOCA, is continuously vented to atmosphere. Therefore, the leak did not provide a new leakage path to the environment for noble gas activity.

#### 2.0 Significant Safety Consequences and Implications

No significant safety consequences resulted from this event because all safety systems responding appropriately and the unit never entered a post LOCA recirculation mode. All Operations Department responses were prompt and in accordance with the emergency procedures. The isotopic analysis of the RWST sample, taken on August 6, 1992, indicated no minimum detectable gaseous activity. Therefore, the health and safety of the public was not affected at any time during this event.

### 3.0 Cause of the Event

The SI signal was generated when the "A" and "B" main steam line flows increased to offset the loss of flow from "C" steam generator caused by the "C" MSTV closure. The most probable cause of the "C" MSTV closure was failure of the MSTV air cylinder rupture disc. An evaluation of the rupture disc design revealed the discs are operating at or slightly above the manufacturers recommended normal operating pressure of approximately seventy percent of rupture pressure. This may have contributed to the failure.

The cause of the isolation vent valve weld failure is believed to be a result of an overstress condition due to the lack of flexibility in the half inch vent line.

### 4.0 Immediate Corrective Actions

A Notification of Unusual event was declared at 0756 hours. The Emergency Procedures were entered, and it was determined that "C" MSTV had closed.

Unit 2 isolation valve 2-SI-377 was closed to terminate the leak. The corresponding Unit 1 isolation vent valve, 1-SI-332, was also closed even though the piping configuration is different. Additionally, Units 1 & 2 valves with a similar configuration were also closed.

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### 5.0 Additional Corrective Actions

The rupture discs on the "C" MSTV air cylinders were replaced, and the rupture discs associated with the other two MSTVs were inspected. Post maintenance testing was completed to ensure all rupture discs and control circuitry were in an acceptable condition, the three MSTVs were returned to the open position.

The first isolation valve on the LHSI pump discharge vent lines in the QSPH of both units and Units 1 & 2 valves with a similar configuration will remain tagged closed until cause of the leakage can be determined and resolved.

An isotopic analysis was performed on a RWST sample and no detectable activities for gases were found.

### 6.0 Actions to Prevent Recurrence

An evaluation of ES-1.1 will be performed to determine if procedural enhancements can be implemented to allow terminating SI flow prior to approaching a solid water condition.

An evaluation will be performed to determine if replacement of current rupture discs with discs that have better operating margins is prudent.

Design Change Package, 92-277 is being written to provide vent line tube routing and support modifications which will accommodate the axial movement of the eight inch safety injection line.

## 7.0 Similar Events

LER 50-338/86-006-00 documents a reactor trip from mode 1 and 100 percent power due to closure of the "B" MSTV. The cause of the valve failure was attributed to prior damage to the air cylinder rupture discs.

LER 50-338/91-017-01 documents a reactor trip from mode 1 and 100 percent power due to closure of the "A" MSTV. The cause of the event was water entering the MSTV control relay junction box.

## 8.0 Additional Information

North Anna Unit 1 was in mode 1 at 95% power throughout this event and was not affected.

The sixth Unit 2 ECCS actuation reportable under TS 6.9.2 occurred on September 20, 1991, with the unit at 100 percent power (mode 1). (LER 50-339/91-009-00) The "B" Main Feed Regulating Valve closure and subsequent reactor trip was caused by failure of the valve driver card. The SI signal was caused by a malfunction in the steam dump control system which prevented the valves from modulating closed.

ATTACHMENT 1 TO 9209090119 PAGE 1 OF 1

Vepco VIRGINIA ELECTRIC AND POWER COMPANY  
NORTH ANNA POWER STATION  
P. O. BOX 402  
MINERAL, VIRGINIA 23117

10 CFR 50.73

August 28, 1992

U. S. Nuclear Regulatory Commission NAPS:MPW  
Attention: Document Control Desk Docket Nos. 50-339

Washington, D.C. 20555 License Nos. NPF-7

Dear Sirs:

The Virginia Electric and Power Company hereby submits the following  
Licensee Event Report applicable to North Anna Unit 2.

Report No. 50-339/92-007-00

This Report has been reviewed by the Station Nuclear Safety and Operating  
Committee and will be forwarded to the Corporate Management Safety Review  
Committee for its review.

Very Truly Yours,

G. E. Kane  
Station Manager

Enclosure:

cc: U.S. Nuclear Regulatory Commission  
101 Marietta Street, N.W.  
Suite 2900  
Atlanta, Georgia 30323

Mr. M. S. Lesser  
NRC Senior Resident Inspector  
North Anna Power Station

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